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10 METHOD AND APPARATUS FOR DISPLAYING TELEVISION  
PROGRAMS AND RELATED TEXT

Cross-Reference to Related Applications

15 This application is a continuation-in-part of application Serial No. 08/312,863, filed September 27, 1994, which is a continuation-in-part of application Serial No. 08/298,997, filed August 31, 1994. The disclosures of these applications are incorporated fully herein by reference.

20 Background of the Invention

25 This invention relates to the field of television and, more particularly, to a method and apparatus for simultaneously displaying video programs and related text on a television screen.

30 For a number of years television receivers have been equipped with picture-in-picture (PIP) capability. In PIP format, the moving, real time images of one television channel are displayed on the background of the screen and the moving, real time images of another television channel are displayed in a PIP window overlaid on a small area of the background. Because two channels are simultaneously displayed by the television receiver, two tuners are required. The viewer enters the PIP mode by pressing a 35 PIP key of his or her controller. Then, the viewer can change either the channel of the background or the channel of the PIP by resetting the appropriate tuner. To reverse

1        the background and PIP images, the viewer simply presses  
a SWAP key. To collapse the PIP window, the viewer again  
presses the PIP key.

5        Television program guides help television viewers  
select programs to watch. Such television program guides  
list the available television programs by day of the week,  
time of day, channel, and program title. For many years  
television program guides have been published in hard copy  
form. More recently as illustrated by Levine Patent  
10      4,908,713, television program guides have begun to take an  
electronic form. In other words, the schedule of program  
listings is stored in an electronic memory connected to  
the television receiver. The program listings are  
recalled from memory by the viewer on command for display  
15      on the television screen.

20      Despite the prevalence of television program guides,  
many viewers still make their program selections by  
switching the television tuner from channel to channel and  
observing on the screen what program is being received on  
the respective channels. This process is sometimes called  
"grazing."

25      Emanuel Patent 5,161,019 discloses an automated form  
of channel grazing. A preselected group of channels are  
sequentially scanned by switching the tuner of the  
television receiver from channel to channel. A still  
image of the program received on each channel is stored in  
a memory. After all the channels have been scanned, the  
still images from all the channels are simultaneously  
displayed on the television screen. This process gives  
30      the viewer more information about the program choices in  
addition to that obtainable from a television program  
guide, namely, the displayed still images of the actual  
programs.

35      Summary of the Invention

According to the invention, the moving images of a  
television program are displayed in a PIP window on the

1       screen of a television monitor and textual information  
2       related to the television program is displayed in the  
3       background on the screen. Preferably, the audio portion  
4       of the television program displayed in the PIP window is  
5       also reproduced by the sound system of the television  
6       monitor. The textual information is arranged on the  
7       screen so none of it is covered by the moving images.

8       In one embodiment, the textual program related  
9       information (PRI) is a television program schedule. One  
10      of the program listings of the schedule identifies by  
11      title and time and/or channel the television program in  
12      the PIP window, which comprises moving images.

13      To facilitate channel grazing, a television viewer  
14      can use a PIP format for display of current television  
15      program listings from a program schedule data base in the  
16      background and moving, real time images of a program  
17      selected from the displayed listings in the PIP window.  
18      Specifically, as the viewer selects a particular program  
19      from the displayed current television program listings by  
20      means of a cursor or a code number, the corresponding  
21      program automatically appears in the PIP window. In this  
22      way, the viewer can channel graze by sequentially  
23      selecting the individual program listings in the  
24      background. When the viewer finds a program that the  
25      viewer wishes to watch, the viewer leaves the PIP format  
26      and returns to full screen television viewing, the tuner  
27      already being set to the desired program. To do this the  
28      viewer can reverse the background and PIP window and then  
29      collapse the window, leaving the desired program on the  
30      full screen or apparatus can be configured to return to  
31      full screen viewing in a single step.

32      To permit the viewing of programs scheduled for  
33      future broadcast without losing sight of the current  
34      program being watched, a television viewer can use a PIP  
35      format for display of television program listings for a  
36      specific channel from a program schedule data base in the  
37      background and moving, real time images of the current

1       program on that channel in the PIP window. Specifically,  
as the viewer changes channels, the current program on  
that channel automatically appears in the PIP window. The  
viewer can control the background to display program  
5       listings for a period of days, e.g. a week, in the future.  
In this way, the viewer can continue to watch a television  
program while ascertaining the future programs on the  
channel to which the television tuner is set. When the  
viewer finds a program that the viewer wishes to watch,  
10      the background disappears, leaving the program on the  
channel to which the tuner is set on the full screen.

15       In another embodiment, a television viewer can use a  
PIP format for display of future television program  
listings from a program schedule data base in the  
background and moving images of a video clip of one of the  
program listings in the background display selected for  
example by a cursor.

20       In yet another embodiment, the textual program  
related information (PRI) is a message that is broadcast  
in the vertical blanking interval of the television signal  
contemporaneously with the television program displayed in  
the PIP window.

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1        **Brief Description of the Drawings**

The features of specific embodiments of the best mode contemplated of carrying out the invention are illustrated in the drawings, in which:

5        FIG. 1 is a schematic block diagram of a television receiver incorporating the principles of one embodiment of the invention;

FIGS. 2, 3, and 4 are television screens formatted in accordance with the embodiment of FIG. 1;

10        FIG. 5 is a schematic block diagram of part of a television receiver incorporating the principles of another embodiment of the invention;

FIGS. 6 and 7 are television screens formatted in accordance with the embodiment of FIG. 5; and

15        FIG. 8 is a television screen formatted to simulate a picture-in-picture window.

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1        **Detailed Description of a Specific Embodiment**

5        In the following description of the embodiments of the invention, common reference numerals are used to represent the same components. If the features of all the 10 embodiments are incorporated into a single system, these components can be shared and perform all the functions of the described embodiments.

15      In a preferred embodiment, the invention displays information about television program schedules and content 20 in a tripartite electronic television program guide. One screen format is a time specific program guide (TISPG); another screen format is a channel specific program guide (CSPG); and the third screen format is a theme specific program guide (THSPG). In each case, the moving images of a currently broadcast television program are displayed in real time in a PIP window.

25      With reference to FIG. 1, a source of television signals 10 such as a terrestrial antenna, or a cable is connected to a television tuner 11. The output of tuner 11 is a modulated intermediate frequency signal containing video and audio television information. Tuner 11 is connected by an intermediate frequency amplifier (IF AMP) 12 to a picture detector (PICTURE DET) 13 and a sound detector (SOUND DET) 14, which produce base band video and audio signals, respectively. The audio signal is coupled by a sound amplifier (SOUND AMP) 15 to a loudspeaker 16. The video signal is coupled by a video amplifier not shown to one input of a switch 18. Sound detector 14 and picture detector 13 are connected to the audio and video 30 inputs, respectively, of a video cassette recorder (VCR) 17. (Alternatively, television signal source 10 could be directly connected to the RF input of VCR 17, if its internal tuner and demodulating circuitry is to be utilized.) The output of VCR 17 is connected to the other 35 input of switch 18. The output of switch 18 is connected to one input of a conventional picture-in-picture (PIP) integrated circuit chip 19. The output of PIP chip 19 is

1 connected to the video input of a television receiver or  
monitor (TV) 20 having a screen (not shown).

5 An updatable data base of the schedule of program  
listings of all the available channels for a prescribed  
period of time, e.g. a day or a week, is electronically  
10 stored in a program schedule memory 22. These program  
listings typically include for each program the title, a  
program description, the day of the week, the start time  
of the day, the program length, and the channel on which  
15 the program is transmitted and thus available for  
reception at source 10. In a preferred embodiment of the  
invention, the period of time for which the program  
listings are stored is different for the guides, depending  
upon viewer priorities and preferences. For example, the  
20 information needed to display the TISPG and CSPG may be  
stored for one or two days and the information needed to  
display the TSPG may be stored for a week or more. The  
data base can be updated by a continuous data link in the  
vertical blanking interval (VBI) of one television channel  
25 broadcast to the television receiver in well known  
fashion. Alternatively, the data base can be updated by  
unplugging memory 22 and replacing it with a memory having  
the updated data base. Memory 22 is connected to a  
microprocessor 24 that is programmed to control the  
30 operation of the described equipment. An operating  
program for microprocessor 24 is stored in a read only  
memory (ROM) 26. A viewer input device 28, preferably in  
the form of a remote IR controller, is coupled to  
microprocessor 24 to provide commands from the viewer. A  
35 video processor 30 is coupled to microprocessor 24. When  
the viewer wishes to see television program listings,  
microprocessor 24 recalls a portion of the program  
schedule data base from memory 22 and couples it to video  
processor 30, where the program listings are formatted for  
display. Preferably, the information stored in video  
processor 30 is a bit map of what is displayed on the  
screen of television receiver 20. Video processor 30 is

1 connected to the other input of PIP chip 19. Preferably,  
input device 28 controls microprocessor 24 by cursor  
movement on the screen of television receiver 20. To this  
end, microprocessor 24 and video processor 30 are coupled  
5 to a cursor position register 32. (Alternatively, the  
viewer can select items of information displayed on the  
screen by keying into viewer input device 24 code numbers  
assigned to these items.) Microprocessor 24 is also  
coupled to tuner 12 for channel change, to VCR 16 for  
10 play/record selection and start/stop, to switch 18 for  
selection of one of its inputs, and to PIP chip 1 for  
selection of the mode of PIP operation.

The formats of the electronic program guide are shown  
15 in FIGS. 2 to 5. Each format has a background area 40 and  
an overlayed PIP window 42 in the upper left-hand corner  
of the screen. The real time, i.e., 6:15 p.m., is  
displayed in a sub-area 42a of PIP window 42. Background  
area 40 includes a banner and message prompting area 43 at  
20 the top of the screen, a program description area 44 in  
the upper right-hand corner of the screen adjacent to PIP  
window 42, and a program schedule area 46 below areas 42  
and 44. Program description area 44 includes the start  
time and length (duration) of the program being described.  
The viewer can move a cursor 48 vertically to highlight  
25 one of the program listings displayed in area 46. The  
highlighted background of cursor 48 and the background of  
program description area 44 are the same color or shade.  
In each format, the moving images of a currently broadcast  
television program in real time and the current time are  
30 displayed in PIP window 42 and the audio portion of the  
television program displayed in PIP window 42 is  
reproduced by the sound system of monitor 20. The  
information displayed in areas 43, 44, and 46 varies  
depending upon the format.

35 One version of the TISPG screen format is shown in  
FIG. 2, namely a version that displays program listings of  
television programs being broadcast at the current time.

1        Program schedule area 46 has a column for channel name or  
call letters, a column for channel number, and a column  
for program title; each line of area 46 represents a  
separate program listing. The moving, real time images of  
5        the current television program highlighted by cursor 48  
are displayed in PIP window 42 and a brief program  
description of the highlighted program is displayed in  
area 44.

10      In FIG. 3 another version of the TISPG screen format  
displays in area 46 program listings being broadcast at a  
future time, i.e., 8:00 p.m. The viewer can select the  
future time of the program listings to be displayed at  
intervals such as one-half hour. The selected future  
15     time, i.e., 8:00 p.m., for the program listings displayed  
in area 46 is shown in a sub-area 43a of area 43. A brief  
program description of the program listing highlighted in  
area 46 by cursor 48 is displayed in area 44. The current  
program being broadcast remains displayed in PIP window  
20     42, and a banner 49 which identifies the current program  
by channel name, channel number, and program title is  
displayed between PIP window 42 and area 46 on a  
background having a different color or shade than cursor  
48.

25      In FIG. 4, the CSPG screen format is shown. All the  
program listings for a selected channel, i.e., FOX Channel  
7, are displayed in area 46, from the currently broadcast  
program into the future for a specified time period, e.g.,  
24 hours or until the end of the next day. Area 46 has a  
30     column for time and a column for program title; each line  
of area 46 represents a separate program listing. The  
moving, real time images of the current television program  
are displayed in PIP window 42. If the cursor also  
highlights the current program, a brief program  
description of the current program is displayed in area  
35     44. If the cursor highlights another program listing, as  
shown in FIG. 3, a brief program description of the  
highlighted program is displayed in area 44 and the

1        current program is identified in banner 49 by time and  
title.

5        In FIG. 5, the THSPG screen format is shown. The  
program listings for a selected theme or subtheme, i.e.,  
ALL MOVIES, are displayed in area 46, from the next  
broadcast program into the future for a specified time  
period, e.g., one week. Area 46 has a heading 46a that  
identifies the theme or subtheme, date, and day, i.e., ALL  
MOVIES DEC 12 MON, a column for title, a column for start  
10      time, and a column for channel name or number; each line  
of area 46 represents a separate program listing. The  
moving, real time images of the current television program  
are displayed in PIP window 42 and the current program is  
15      identified in banner 49 by channel name or number and  
title. A brief program description of the program  
highlighted by cursor 48 is displayed in area 44.

20      All four areas of background 40 are formatted in  
video processor 30. The memory space of video processor  
30 corresponding to the area in which PIP window 42  
25      appears on the screen is left blank; i.e., although  
overlaid on background area 40, PIP window 42 does not  
cover up any of the information of background area 40. By  
means of a pair of up/down arrows on input control device  
28, the viewer can move a cursor 48 vertically to  
highlight the listing of one of the currently playing  
30      television programs displayed in area 46. Preferably, to  
reduce delays in displaying the program schedules, all the  
program listings for the particular screen format are  
stored in video processor 30, even though only a fraction  
35      of them are displayed at the same time. When the cursor  
reaches the top or bottom listing in area 46,  
microprocessor 24 recalls further program listings from  
video processor 30 for display on the screen of television  
receiver 20.

35      In all the formats, the moving, real time images of  
the current television program highlighted by cursor 48  
are displayed in PIP window 42, the program description of

1 the highlighted program is displayed in area 44, program  
listings of one type or another are displayed in area 46,  
and one or more prompts are displayed in banner area 43 as  
described in more detail below. The audio portion of the  
5 television program displayed in PIP window 42 is  
reproduced by the sound system of monitor 20. The PIP  
display, the sound reproduction, and the program  
description in area 44 enable the viewer to assess better  
whether or not to watch the highlighted program. As the  
10 viewer moves cursor 48 vertically from program listing to  
program listing, the current television program displayed  
in window 42 and the program description displayed in area  
44 automatically change accordingly to match the  
highlighted program in area 46. As the cursor moves from  
15 one program listing to another, tuner 12 is set to the  
channel for the highlighted program listing so the program  
can be displayed in PIP window 42, microprocessor 24  
recalls the program description for the highlighted  
listing from program schedule memory 22, and video  
20 processor 30 formats this program description so it can be  
displayed in area 44.

25 Preferably, two levels of detail are available for  
the program description. Normally, the first level detail  
of the program description is displayed in area 44 as  
described above. When more detail is desired, the viewer  
operates input device 28 to display an second level detail  
30 of the program description. There are two options for the  
display of the second level detail. As one option, the  
second level detail can replace the first level detail in  
area 44. This has the advantage that the program listings  
can continue to be seen by the viewer while more detail  
about the program description is displayed. As the other  
35 option, the second level detail can replace the program  
listings in area 46. This has the advantage that more  
space is available to display the second level of detail  
than the first level.

1        Reference is made to FIGS. 6 to 13 for a description  
of the steps taken by a user to navigate about the  
preferred embodiment of the television program guide.  
5        Viewer input device 28 preferably takes the form of a  
hand-held remote infrared (IR) transmitter which  
communicates with an infrared receiver connected to  
microprocessor 24. As shown in FIG. 6, the IR transmitter  
has a housing 50 on which a number of control buttons are  
10      mounted. A GUIDE/TV button 52, an INFO button 54, and a  
VCR PLUS+ button 56 are located above up and down arrow  
buttons 58 and 60. A row of buttons 62, 64, 66 and 68  
which marked with the colors red (R), green (G), yellow  
(Y), and blue (B), respectively, underlie down arrow  
button 60. Red, green, yellow, and blue prompts are  
15      displayed in area 43 of the electronic guides. To select  
a prompt on the screen, the button of the IR transmitter  
having the corresponding color is pressed, i.e., to select  
the blue prompt on the screen, blue button 68 is pressed.

20      The screen formats and the links between the  
individual guides are designed with two objectives in  
mind--first, always to display the program the viewer was  
watching before entering the electronic guide and second,  
never to leave the electronic guide while navigating  
through it, until the viewer returns to the TV mode. As  
25      described below, the guides are linked to each other in a  
one way hierarchy that are accessed by on screen prompts  
color coded to the buttons on the remote control  
transmitter. At each level of the hierarchy, the view has  
the choice of returning to a backbone guide, or moving  
30      down to a guide at a lower level in the hierarchy. At the  
lowest level, the only choice is to return to the backbone  
guide.

35      As represented in FIG. 7 by a box 70, the viewer  
enters the electronic guide by pressing GUIDE/TV button 52  
on the remote controller. As represented by a box 72, the  
so-called "NOW" guide is then displayed on the screen.

1        This is the "backbone" of the electronic guide in that it  
is the starting point for entry into each other guide.

5        As represented by a box 74 in each of FIGS. 8 to 13,  
the user may cursor up and down the program listings in  
area 46 to select a particular program. As represented by  
a box 76 in each of FIGS. 8 to 13, the user presses  
GUIDE/TV button 52 to return to the full screen TV mode  
and presses INFO button 54 to display the second level  
detail of the program information in area 44 or area 46.

10       In FIG. 7 a box 80 depicts the layout of the NOW  
guide, which is a version of the TISPG screen format.  
Area 43 has a blue "CHOICE" prompt and a banner that  
identifies the format as the "NOW" format and displays the  
date, day, and time. When the viewer presses blue button  
15       68 on the remote controller (FIG. 6), as represented by a  
block 82, four prompting choices are presented to the  
viewer. As represented by a block 84 in FIG. 8, these  
prompting choices are displayed in an "ALL CHANNEL" guide.

20       Block 86 represents the "ALL CHANNEL" guide, which is  
identical to the "NOW" guide except for area 43. This is  
a transition guide in that it permits the viewer to enter  
other guides at a lower level of the hierarchy by  
following the displayed prompts. In the "ALL CHANNEL"  
25       guide, a red NOW prompt, a green CSPG prompt, a yellow  
NEXT prompt, and a blue SORT prompt are displayed. As  
represented by a box 88, in each of the guides of FIGS. 8  
to 14, a return to the NOW guide of FIG. 7 occurs when the  
viewer presses red button 62 on the remote control  
transmitter.

30       As represented by a box 92 in FIG. 9, when green  
button 64 is pressed from the ALL CHANNEL guide, a "THIS  
CHANNEL" guide in the CSPG format described above is  
displayed. A box 94 depicts the THIS CHANNEL guide, which  
is at the bottom of the hierarchy. So, only one prompt is  
35       displayed in area 43, namely the red NOW prompt, which  
permits the viewer to return to the NOW guide. Area 43

1 also displays the name and channel number of the specific  
channel, e.g. ABC, Channel 7.

5 As represented by a box 96 in FIG. 8 and a box 98 in  
FIG. 10, to display a "NEXT" guide, the viewer presses  
yellow button 66 on the remote control transmitter. The  
NEXT guide, which has CSPG format for a future time, is  
depicted by a box 100. Area 43 in the NEXT guide has in  
addition to the red NOW prompt, a green up arrow prompt,  
10 and a blue down arrow prompt. Area 43 also displays the  
future time at which the listed programs are broadcast.  
When the viewer presses green button 64, the programs  
being broadcast at a one-half earlier time are displayed,  
as represented by a box 102. When the viewer presses blue  
button 68, programs broadcast at a one-half hour later  
15 time are displayed as represented by a box 104.

As represented by a box 105 in FIG. 8 and a box 106  
in FIG. 11, screen one of a "SORT" guide is displayed when  
the viewer presses blue button 68 in the ALL CHANNEL  
20 guide. The SORT guide is in the THSPG screen format  
described above. As depicted by a box 108, in addition to  
the red NOW prompt, a green MOVIES prompt, a yellow SPORTS  
prompt, and a blue OTHERS prompt are displayed in area 43.  
Screen one of the SORT guide is displayed in area 46. In  
25 screen one of the SORT guide, when the viewer presses  
green button 64, screen one of an "ALL MOVIES" guide is  
displayed as represented by a box 112 in FIG. 12. Screen  
one of the ALL MOVIES guide is represented graphically in  
a box 114. In addition to the red NOW prompt, a green  
30 ACTION prompt, a yellow COMEDY prompt and a blue OTHER  
prompt are displayed in area 43. When the viewer presses  
green button 64, an ACTION MOVIE guide is displayed. When  
the viewer presses yellow button 66, a COMEDY MOVIES guide  
is displayed in area 46. When blue button 68 is pressed,  
35 as represented by a box 120 in FIG. 12 and a box 122 in  
FIG. 13, screen two of an all movies guide is displayed.  
As represented graphically by a box 124, when screen two  
of the ALL MOVIES guide is displayed, in addition to the

1 red NOW prompt a green DRAMA prompt, the yellow HORROR  
prompt and a blue ALL OTHERS prompt is displayed. Instead  
of an ALL MOVIES guide, a screen three ALL MOVIES could be  
displayed if more theme subcategories are desired. The  
5 only difference between screen one and screen two of the  
ALL MOVIES guide is that the prompts are in area 43. The  
reason for multiple screens in the ALL MOVIES guide is to  
provide a number of prompts in area 43 of the screens to  
display all the subcategories of the particular category,  
10 i.e., movies. In the ALL MOVIES guide, the sum of the ALL  
MOVIES in the subcategories are displayed (mention another  
subcategory as ALL OTHER movies).

As represented in FIGS. 11 and 14, when the user  
15 presses blue prompt button 68 from screen one of the SORT  
guide, screen two of the SORT guide is displayed. As  
depicted graphically by box 132, in addition to the red  
NOW prompt, a green CHILD prompt, a yellow SPECIAL and a  
20 blue SERIES prompt are displayed in area 43. When the  
viewer presses green button 64, an ALL CHILDREN's guide is  
displayed as represented by a box 34. When the viewer  
presses white button 166, an ALL SPECIAL guide is  
displayed as represented by a box 136. When the viewer  
25 presses blue button 68, an ALL SERIES guide is displayed  
as represented by a box 138. Although not depicted in the  
drawings, the ALL SPORT, ALL CHILDREN, ALL SPECIAL, ALL  
SERIES action movies, comedy movies, drama movies, horror  
movies and all other movies guides each contain program  
30 listings classified in the category or subcategory  
corresponding to the guide name. Since these guides are  
of the lowest level of the hierarchy, the only prompt  
played in area 43 is the red NOW prompt, which returns the  
viewer to the backbone guide. (note to LTR, state that the  
other categories could also be broken into subcategories  
as with the movies).

35 As described in more detail below, in program  
schedule memory 22, the program listings are coded by day  
of the week, time of day, and channel so that they can be

1       accessed by microprocessor 24 when necessary to supply  
2       program schedule information to video processor 30 to  
3       compose the program listings and the program descriptions.  
4       Microprocessor 24 has a real time clock (not shown), the  
5       time of which is compared with the time of day and day of  
6       the week codes to select the program listings for the  
7       TISPG mode. The functional storage areas of cursor  
8       position register 32 are mapped to the storage areas of  
9       vector processor 30 where the program schedule is  
10      formatted for display on screen area 40 so cursor position  
11      register 32 points to the area of the screen, and thus the  
12      particular program, that is highlighted by cursor 48. By  
13      comparing the cursor position in register 32 with the  
14      channel corresponding to the highlighted area of video  
15      processor 30, the channel of the highlighted program is  
16      derived and coupled to microprocessor 24. Microprocessor  
17      24 then sets tuner 12 to this channel.

18       In TISPG operation, microprocessor 24 recalls the  
19      appropriate program listings from memory 22 and transmits  
20      them to video processor 30 where the program listings of  
21      area 46 and the program description of the highlighted  
22      program in area 44 are composed. At the same time,  
23      microprocessor 24 operates switch 18 so the output of  
24      tuner 12 is directly connected to the one input of PIP  
25      chip 19 and switches PIP chip 19 into a PIP mode, such  
26      that the input from tuner 12 is displayed in the PIP  
27      window and the program schedule from video processor 30 is  
28      displayed in the background. Microprocessor 24 senses the  
29      channel to which the tuner is set when the TISPG mode is  
30      entered, and initially positions cursor 48 at the program  
31      listing broadcast on this channel. As the viewer moves  
32      the up/down arrows of the cursor control key set, tuner 12  
33      is reset accordingly and new program schedule information  
34      is fed through microprocessor 24 to video processor 30 to  
35      recompose the program listings so cursor 48 remains  
      visible and the program description remains current. The  
      described TISPG mode facilitates channel grazing by the

1 viewer. When the viewer finds the video program he or she  
2 wishes to watch, the viewer leaves the TISPG mode. As a  
3 result, microprocessor 24 switches PIP chip 19 out of the  
4 PIP mode, such that the video program inputted from tuner  
5 12 is displayed full screen.

If the viewer wishes to record the program highlighted in the TISPG mode, the viewer commands microprocessor 24 to turn on VCR 16 for recording.

10 If the viewer wishes to play a video tape cassette on VCR 16, the viewer commands microprocessor 24 to turn on VCR for playback and to operate switch 18 for connection of the output of VCR 16 through PIP chip 19 to television receiver 20.

15 The television receiver of FIG. 1 can also be used with the format of FIGS. 3 or 4 in an extension of the CSPG mode to display previews of future programming as video clips. The video clips are stored on a video tape cassette that is loaded into VCR 16. The addresses of the video clips on the tape of the video cassette are stored  
20 in program schedule memory 22 as part of the data base. These addresses are linked to the respective future program listings in the data base so that a video clip can be accessed on the tape when a program listing is designated in the database. When the viewer presses the  
25 CSPG mode key, in addition to the operation as described in connection with FIG. 3, microprocessor 24 highlights the current program title with cursor 48, as illustrated in FIG. 3. So long as cursor 48 highlights the title of the current program, the CSPG mode operates as described  
30 above. When the viewer moves cursor 48 vertically by operating the cursor control key set on input device 28 to highlight the title of a future program displayed in area 50, the address of the video clip of the highlighted program listing is retrieved by microprocessor 24 from  
35 program schedule memory 22 and transmitted to VCR 16. The video clip is retrieved from the tape in VCR 16 and coupled through switch 18 and PPI chip 19 to television

1 receiver 24 for display in PIP window 42. The video clips  
on the tape of the videocassette are indexed and accessed  
in the manner described in co-pending application Serial  
No. 08/176,852, filed on December 30, 1993 and entitled  
5 ENHANCING OPERATIONS OF VIDEOTAPE CASSETTE PLAYERS, the  
disclosure of which is incorporated fully herein by  
reference.

An extension of the TISPG mode illustrated in FIG. 2  
also permits display of video clips of future programming.  
10 Specifically, in the time-channel grid format  
microprocessor 24 also controls cursor 48 responsive to  
the cursor key set of viewer input device 28, which in  
this embodiment includes a horizontal cursor control, such  
as a pair of right/left arrows. As described above, the  
15 address for the highlighted future program listing is  
retrieved by microprocessor 24 from program schedule  
memory 22 and transmitted to VCR 16 to access the  
corresponding video clip, which is displayed in PIP window  
42.

20 Another embodiment in which video clips can be  
displayed in PIP window 42 is illustrated in FIG. 4. In  
addition to banner area 43 and program description area  
44, background area 40 has program schedule area 52, in  
which program listings are displayed by theme such as  
25 movies, sports, current events, etc. Area 52 contains a  
column for program start time, a column for program  
channel, and a column for program title. To implement this  
embodiment, the program listings of the data base stored  
in program schedule memory 22 are also coded by theme so  
30 that they can be accessed by microprocessor 24 in response  
to the viewer selection of themes from an on-screen menu  
in well known fashion. As described in connection with  
the extended TISPG and CSPG modes described above, when  
35 the title of a future program listing is highlighted by  
cursor 48, the corresponding moving image video clip is  
displayed in PIP window 42. If desired, a video disc  
player could be substituted for VCR 16 to provide the

1       video clips to switch 18 in order to speed up the access  
time to the moving images displayed in PIP window 42.

5       In another embodiment, program related information  
      (PRI) is displayed in background area 40 while the real  
      time television program to which the PRI relates is  
      displayed in PIP window 42. The PRI is transmitted in the  
      vertical blanking interval (VBI) of the television signal  
      of the channel carrying the television program to which  
      the PRI relates, contemporaneously with this television  
10      program. As illustrated in FIG. 15, to implement this  
      embodiment a VBI decoder 54 is connected between the  
      output of tuner 12 and microprocessor 24 and a PRI memory  
      56 is connected to microprocessor 24. The PRI is stripped  
      from the VBI of the television signal by decoder 54 and  
15      stored in memory 56 by microprocessor 24.

20      In operation, when the viewer presses a PRI key on  
      viewer input device 28 the real time television program of  
      the channel to which tuner 12 is set is displayed in PIP  
      window 42. In addition to banner area 43 and program  
      description area 44, background area 40 has a PRI area 58  
      in which different types of PRI are displayed. In FIG. 16  
      the real time television program is a cooking  
      demonstration by Julia Child and the PRI displayed in area  
      58 is a recipe made in the course of the demonstration.  
25      Other information about the program is displayed in area  
      44. In FIG. 17 the real time television program is a  
      commercial for Lexus automobiles and the PRI displayed in  
      area 58 is a test drive offer for Lexus. The name and  
      address of the local Lexus dealer in the geographic area  
30      of the viewer is displayed in area 44.

35      As illustrated in FIG. 18, if the viewer does not  
      have a television receiver with a PIP chip, the same  
      screen format is still displayed in the TISPG, CSPG and  
      PRI modes. Text composed in video processor 30 is  
      displayed in PIP window 42 instead of moving real time or  
      video clip images. For example, in any of the described  
      modes the displayed information could be locally derived,

1 such as time of day, or received in the VBI, such as  
weather, traffic, or news headlines.

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